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Animal Keepers' Forum

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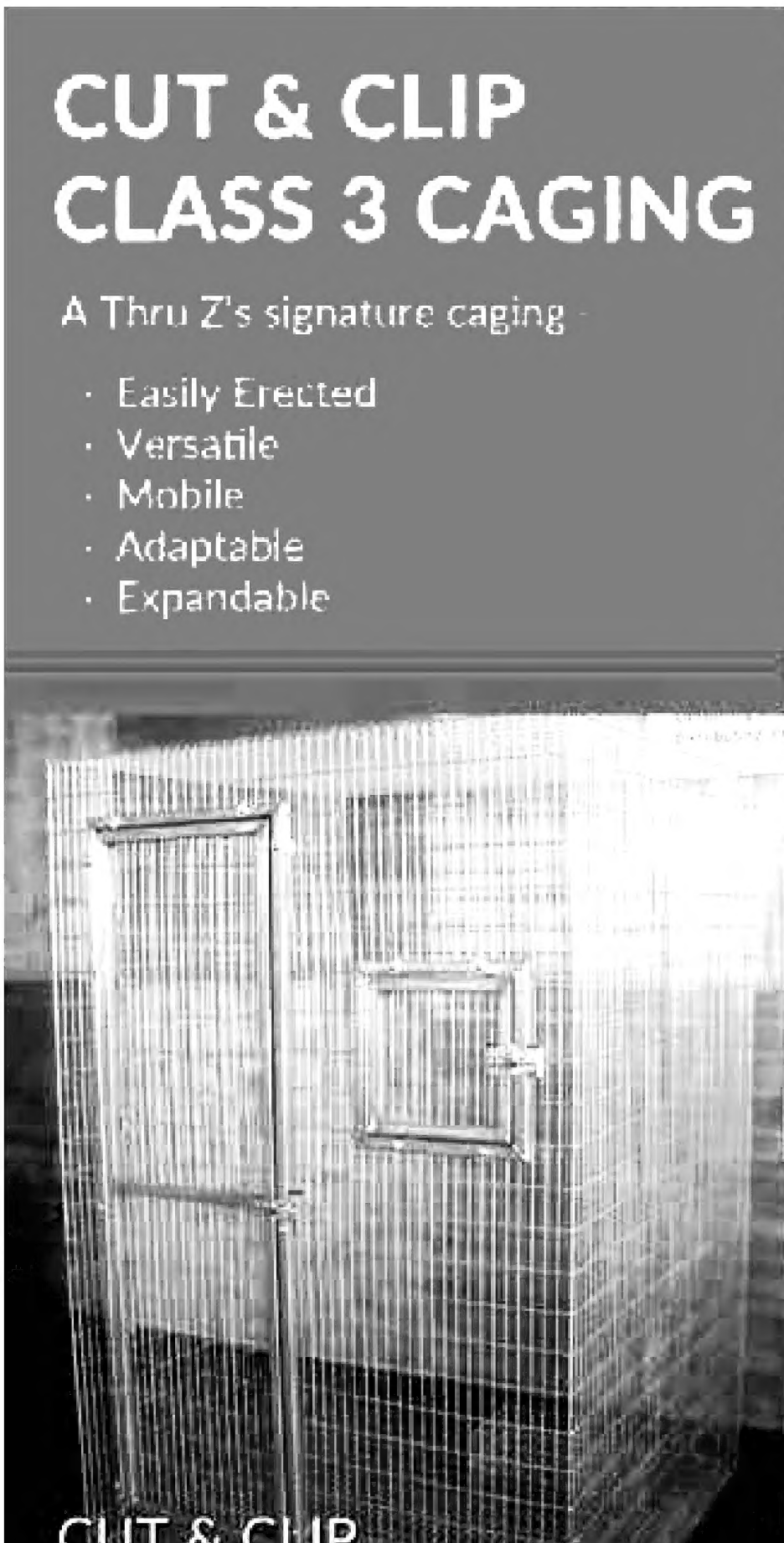

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MISSION STATEMENT

American Association of Zoo Keepers, Inc.

The American Association of Zoo Keepers, Inc. exists to advance excellence in the animal keeping profession, foster effective communication beneficial to animal care, support deserving conservation projects, and promote the preservation of our natural resources and animal life.

ABOUT THE COVER

This month's cover photo comes to us from Dave Liggett of the Columbus Zoo and features a male chestnut-sided warbler (*Dendroica pensylvanica*) singing to attract a mate. This beautiful warbler was photographed at Magee Marsh in Ohio during spring migration. Over 30 species of warblers pause on the southern shore of Lake Erie in early to mid-May each year in order to rest and refuel before continuing their journey northward.

Equaling the weight of two U.S. quarters, chestnut-sided warblers migrate between their wintering grounds in Central America and their breeding grounds as far north as Canada. They nest in deciduous habitats that are recovering from a disturbance. The less colorful female builds the nest and incubates the eggs while both parents feed the young.

See Pp. 22-25 to learn more about how you can get involved with the AZA's SAFE North American Songbird program. SAFE NAS focuses on over 300 species in the order Passeriformes that spend part of their annual cycle in North America. Songbird population declines in North America persist due to habitat loss, climate change, building collisions, and predation from outdoor domestic cats.

Articles sent to *Animal Keepers' Forum* will be reviewed by the editorial staff for publication. Articles of a research or technical nature will be submitted to one or more of the zoo professionals who serve as referees for *AKF*. No commitment is made to the author, but an effort will be made to publish articles as soon as possible. Lengthy articles may be separated into monthly installments at the discretion of the Editor. The Editor reserves the right to edit material without consultation unless approval is requested in writing by the author. Materials submitted will not be returned unless accompanied by a stamped, self-addressed, appropriately-sized envelope. Telephone, fax or e-mail contributions of late-breaking news or last-minute insertions are accepted as space allows. Phone (330) 483-1104; FAX (330) 483-1444; e-mail is shane.good@aazk.org. If you have questions about submission guidelines, please contact the Editor. Submission guidelines are also found at: aazk.org/akf-submission-guidelines/.

Deadline for each regular issue is the 3rd of the preceding month. Dedicated issues may have separate deadline dates and will be noted by the Editor.

Articles printed do not necessarily reflect the opinions of the *AKF* staff or the American Association of Zoo Keepers, Inc. Publication does not indicate endorsement by the Association.

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Animal Data Transfer Forms available for download at aazk.org. AAZK Publications/Logo Products/ Apparel available at AAZK Administrative Office or at aazk.org.

Responsibly FORESTED PAPER

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FROM THE PRESIDENT

As AAZK members reflect upon their accomplishments in the past year and make plans for 2022, consider applying for AAZK Grants to support your goals.

While the accomplishments of the last year are always exciting to look back on, it is often more important to build upon successes and work for consistent improvements. AAZK Grants allow our members to gain support for their professional development, but the 2022 cycle highlights several significant connections to the year that was.

The formation of the AAZK Diversity Committee this past summer demonstrated a commitment to increasing opportunities to diversify the animal care profession by encouraging the recruitment, development, mentoring, and retention of animal keepers from all backgrounds. These efforts take a significant step with the debut of the AAZK Student Diversity Grant. This grant will award funds to minority students for attending the 2022 AAZK National Conference where the attendee can increase their engagement with AAZK, gain knowledge on current efforts in the animal care profession, and network with current AAZK members.

Speaking of the AAZK National Conference, the Los Angeles Chapter of AAZK did a fantastic job as hosts of the first ever hybrid conference in 2021. As we look ahead, the 2022 AAZK National Conference will take on an international flavor as we head to Toronto. An opportunity to travel abroad and connect with professionals from the Toronto Zoo can be supported by several AAZK Grants. Both Professional and Affiliate membership-level grants are awarded and can be put toward registration, hotel, travel, and any other fees the recipient might incur. The Latin American Travel Grant will also be awarded to support Conference attendance for Latin American keepers in collaboration with the AAZK International Outreach Committee.

Finally, AAZK launched AAZK C.O.R.E. earlier this year to support virtual learning for our members. Virtual learning opportunities became a necessity due to travel restrictions, and both virtual **and** in-person learning can be supported by applying for the AAZK Professional Development Grant.

As AAZK members reflect upon their accomplishments in the past year and make plans for 2022, consider applying for AAZK Grants to support your goals. To learn more, visit AAZK.org or contact Grants@AAZK.org.

Cheers,

Paul Brandenburger, AAZK President
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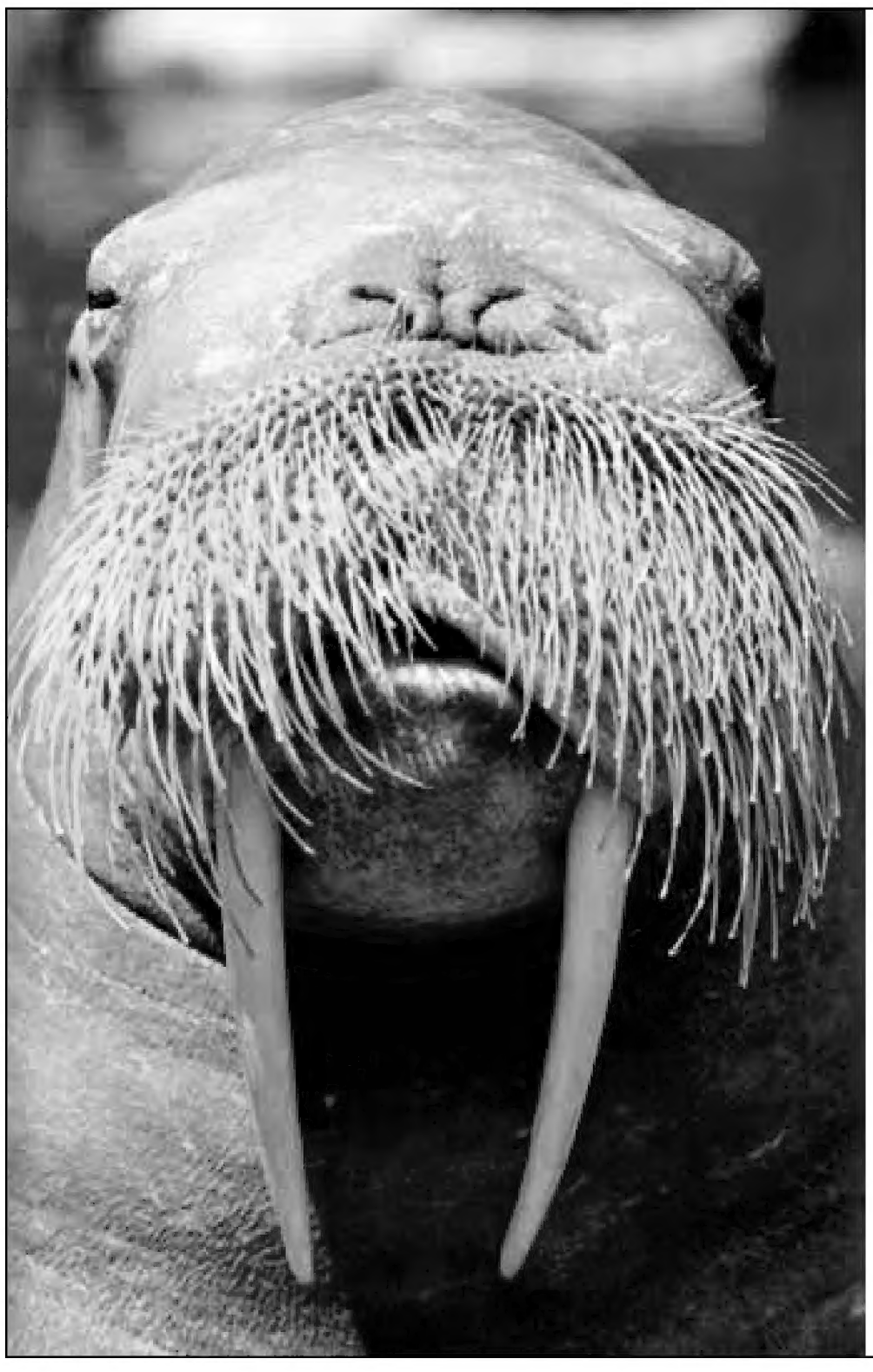
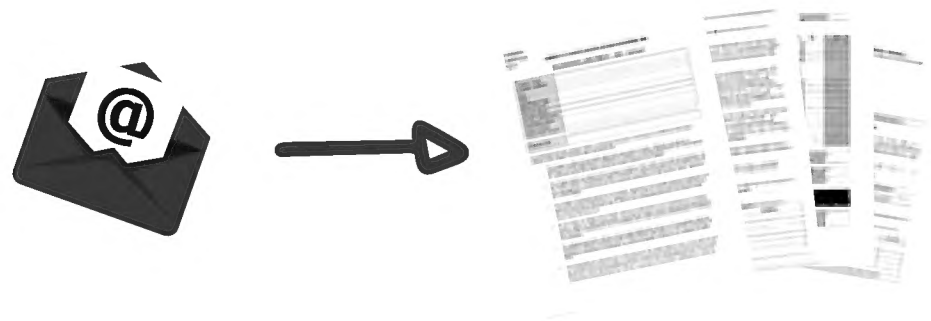
2022 AAZK AWARDS NOMINATIONS OPENED

The American Association of Zoo Keepers (AAZK) Awards Committee is accepting nominations for The AAZK Lifetime Achievement Award, The AAZK Meritorious Achievement Award, The AAZK Lutz Ruhe Professional of the Year Award, The AAZK Jean M. Hromadka Excellence in Animal Care Award, The AAZK Excellence in Animal Nutrition Award, The AAZK Excellence in Exhibit Renovation Award, The AAZK Janet McCoy Excellence in Public Education Award, The AAZK Nico van Strien Leadership in Conservation Award, and the Lee Houts Advancement in Environmental Enrichment Award, which will be presented at the 2022 AAZK Conference in Toronto, Canada.

The deadline for nominations is May 1, 2022. Information concerning the qualifications, nomination procedure, selection procedure and an explanation of the awards may be obtained at www.aazk.org, under committees & programs/awards committee.



THE TIME HAS COME...



...to file your Chapter's Annual Recharter.

"AAZK Chapter Recharter: A Step-by-Step Guide"

is available on AAZK C.O.R.E.
to help you successfully complete your chapter recharter and submit it by the **March 15th** deadline.

Still have questions, just ask.
Ed.Hansen@aazk.org

Husbandry Manual for the Kaiser Newt (*Neurergus kaiseri)*

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ABSTRACT

Newts are notoriously sensitive to environmental changes and are facing increasing challenges in their natural habitats due to increasing temperatures, fluctuating water availability, and habitat destruction. Some *Neurergus* species have been more thoroughly studied in order to predict how changes will impact their populations (Bogaerts et al., 2012; Sharifi et al., 2014), while others are still not well understood. Management strategies including captive husbandry and breeding are not well documented for *Neurergus kaiseri*. After a successful breeding event, it is the intent that this document will share useful information on the captive breeding and husbandry protocols at the Steinhart Aquarium to learn more about these animals.

INTRODUCTION

The Kaiser Mountain Newt *(Neurergus kaiseri)*, also known as the Luristan Newt, Iranian Newt or Emperor Spotted Newt, is a rare and brightly colored species of newt found between 750m to 2000 m altitude in the Zagros Mountain Range of the Luristan province of Iran. It is the smallest of the Neurergus species, reaching lengths of 10 to 14 centimeters, and are easily recognized by the striking black and white pattern spanning the length of its body, as well as the bright orange underside and dorsal line (Curtis, 2014). This species is not sexually dimorphic, as males and females are almost indistinguishable, however, individuals display unique black and white dorsal patterns. Unlike other newt species that inhabit cold and moist habitats, the Kaiser newt comes from a hot and dry climate and must endure periods of aestivation when their seasonal pools evaporate. They are normally found in a variety of aquatic environments including stagnant ponds and pools, edges of waterfalls, slower moving streams, and woodlands surrounding these water sources where they feed on a wide variety of invertebrates, both terrestrial and aquatic (AmphibiaWeb, 2021; Curtis, 2014). During dry periods they may be found dormant under rocks and logs, however, their natural habitat is still not well studied.

This species is currently listed as "Vulnerable" on the IUCN Red List (IUCN, 2016), an upgrade from its previous classification of "Critically Endangered", due to increasingly

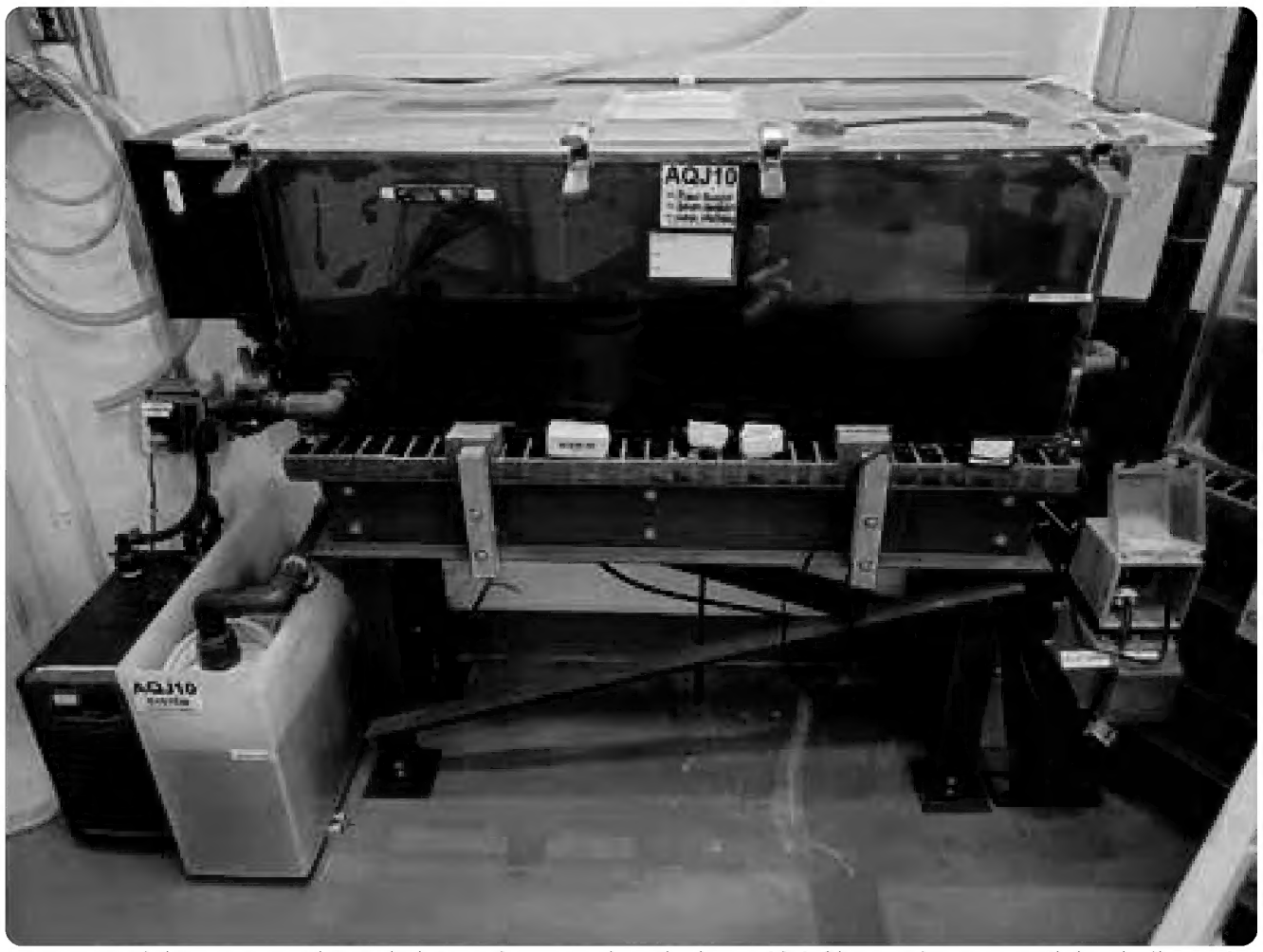


Figure 1. Exhibit set-up with LED lighting above, tank with clasped lid, filter sock, sump with bio-balls, and Arctica water chiller. Photo by Kelsey Paulling.

fragmented subpopulations and a rapid decline in quality of habitat. This uplisting is in response, however, to their reappearance in areas they were previously thought to have been extinct. The lifespan of the Kaiser newt is not well documented, however it is expected that wild newts can live approximately 14 years based on a related species, the Kurdistan Newt, *Neurergus microspilotus* (Sharifi et al., 2014). They have been shown to live at least eight years in captivity (Curtis, 2014).

HOUSING & DECOR

As an equally aquatic and terrestrial species, both environments are ideal, however, they may be kept in a fully aquatic system. Horizontal space is more important than vertical space as these newts tend not to climb or venture too far from the water's edge. An abundance of shelter and crevices are necessary, both in the water and on land, as this species likes to remain hidden when not in search of food.

Our display habitat for our residents is a 375 liter glass tank (120 cm length x 46cm height x 71 cm width) that uses small pebbles as substrate while larger sheet rock shards, logs, and branches are used to create shelter and dimension within the space. A flowing pump waterfall cascades in one edge of the habitat to create turbidity to oxygenate the water and facilitate water flow. Outside the habitat, water passes through a filter sock, sump with bio balls (23 cm length x 46 cm height x 71 cm width), and JBJ Arctica titanium water chiller (range 17 to 21 Celcius, average ~19 C) before it is cycled back into the main habitat (Figure 1). Full sump water changes are conducted weekly.

TEMPERATURE

The habitat is kept consistently between 17 and 21 degrees Celsius (~63-70 Fahrenheit).

A colder water temperature (17-18 C) is utilized to facilitate breeding, while during non-breeding times these animals can tolerate slightly warmer temperatures (21-22 C). Ambient temperatures can be as cold as 10 degrees and as warm as 26 degrees, but should not be maintained at these extremes for long periods of time.

LIGHTING

The main habitat has positioned above it a 48-inch (Finnex Planet +) LED light on an 8 hour loop light cycle from 08:00 to 16:00 daily. The habitats used back of house for metamorphosis also have LED lights. Though it is well known that amphibians require UV light at different strengths dependent upon species, not much is known about Caudate UV requirements, in particular UVB, as it can also be quite damaging. Using UVA/UVB that simulates typical levels found in the natural environment is recommended, provided the animals have shelter away from direct light. As the Kaiser Newt's natural environment, Iran's UV index, which never exceeds 7 and in winter averages 2, may be used as a guideline for their UV requirements. Adults are more tolerant to UV than juveniles; young newts' skin is much thinner and less tolerant of UVB.

HUMIDITY & HYDRATION

The habitat for our residents is kept as a full-time aquatic environment. For terrestrial displays the kaiser newt is more tolerant of a range of humidities as it would naturally go through a short wet season and then a longer dry period in the wild. Kaiser newts must also tolerate periods of estivation lasting close to three months in the wild.

DIET & FEEDING

Diverse options of invertebrates are ideal for maintaining a balanced diet. Any food offered must be of the appropriate size, and any food sourced in salt water (i.e. Brine Shrimp) must be rinsed thoroughly with fresh or deionized water before being offered. Broadcast feeding is the easiest method, especially for juveniles. Adding supplements to dry food (terrestrial food) such as Calcium and Vitamin A is important in maintaining body functions, as newts often may lack some nourishment in captivity. These supplements, along with gentle UV lighting, may help to avoid the more common amphibian ailments. It is recommended to avoid harsh lighting, especially UVB, in the juvenile stage.

<u>Larvae</u>

In the first few weeks of development, larvae must eat relatively often. Offering food two to three times a day will aid in their growth and development. They can consume only small food items such as Baby Brine Shrimp (Artemia) to begin with, but once the larvae develop their hind legs and are large enough, they may start to consume larger invertebrates such as Daphnia and Adult Brine. Make sure these food sources are rinsed

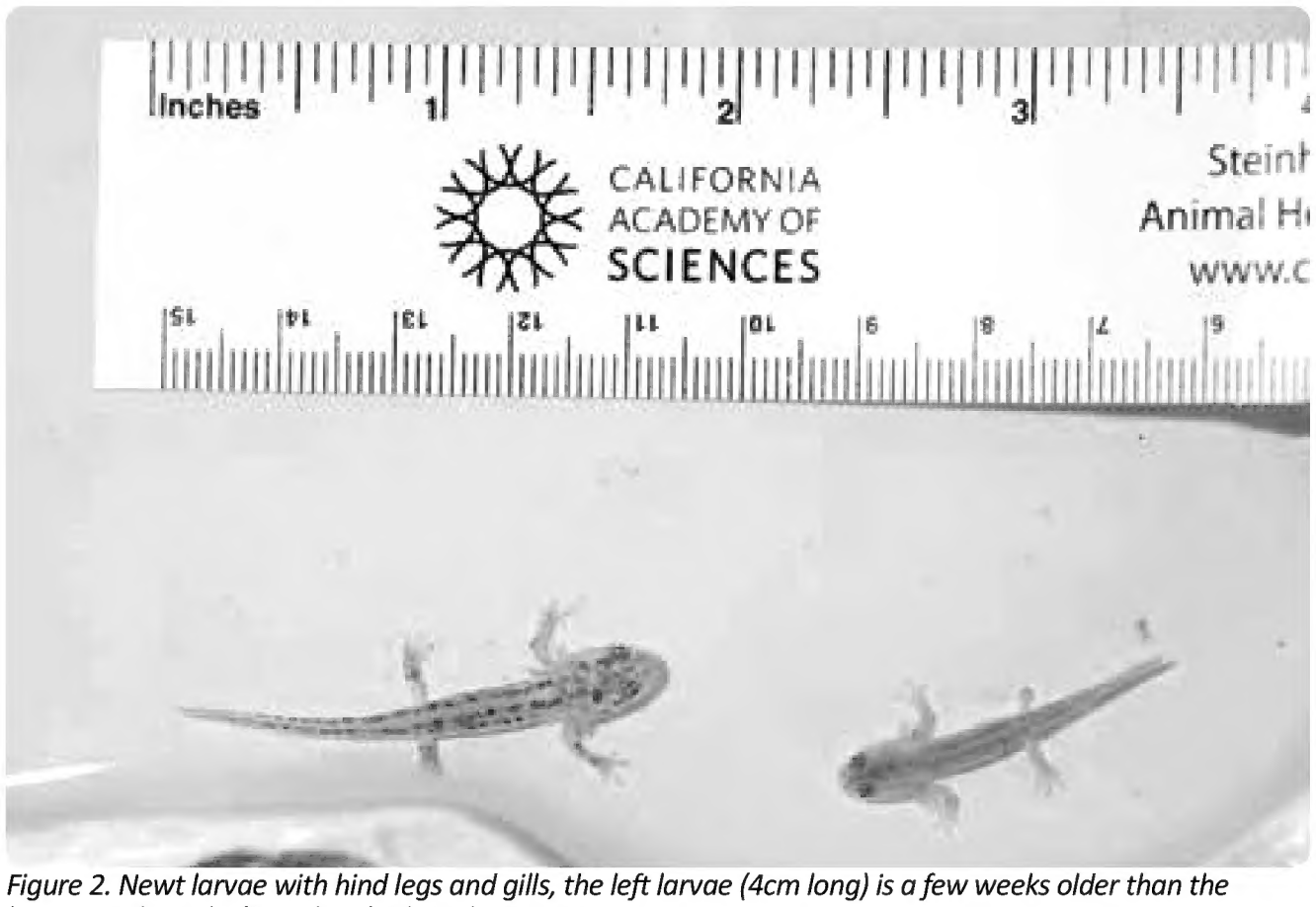


Figure 2. Newt larvae with hind legs and gills, the left larvae (4cm long) is a few weeks older than the larvae on the right (3 cm long). Photo by Tim Wong.

thoroughly so as not to introduce any unwanted pathogens or salts into the water system.

<u>Larger juveniles to adults</u>
In their terrestrial phase, larger juveniles may be fed terrestrial invertebrates such as springtails, pinhead crickets, and fruit flies (*Drosophila melanogaster* and *Drosophila Hydei*). At this phase, they may be fed less frequently such as once a day. Vitamin supplements may be used for terrestrial food items.

Adult Kaiser newts feed readily on a combination of bloodworms, earthworms, crickets, wax worms, adult Brine Shrimp, and Mysis Shrimp. It is not necessary for the adult newts to eat every day, especially if kept at lower temperatures as they have a slower metabolism. Our adult residents are fed a variety of the foods listed above, 3 to 4 times a week.

REPRODUCTION

Breeding season takes place in Spring (March- April). Males will court a female, deposit a spermatophore in front of her and she will pick it up in her cloaca, thereby fertilizing her eggs. A female may lay up to 60 eggs, each deposited singularly or in small clumps, out of direct light, on rocks or logs in the slow moving breeding streams.

Eggs have a gestation period of an average of nine days. Within just a couple of days after being laid, fertilized eggs will begin to develop into an embryo. Unfertilized eggs, alternately will turn darker and remain unchanged. Eggs will hatch into larvae that then go through a full metamorphosis that takes 3 to 5 months to complete. The development rate has been shown to be more rapid at higher temperatures (≥ 20 C).

Newts become reproductively mature at 2 to 4 years of age (Curtis, 2014).

Figure 3. (Bottom Left) Larval rearing tanks consist of many smaller mesh-sided nurseries to separate larvae at different developmental stages. Open sides allow for constant water flow to clear out debris while allowing for food to remain in each nursery. (Bottom Right) Full tank set-up consists of a 300 liter tank with air pump and smaller nurseries within (top), and filter sock, sump, and chiller (bottom). Photos by Kelsey Paulling.

Figure 4. Larvae approaching metamorphosis stage (Left) and terrestrial metamorph (Above Right). Gills begin to shrink until they are fully reabsorbed and adult patterns become very pronounced. Photos by Tim Wong.

REARING

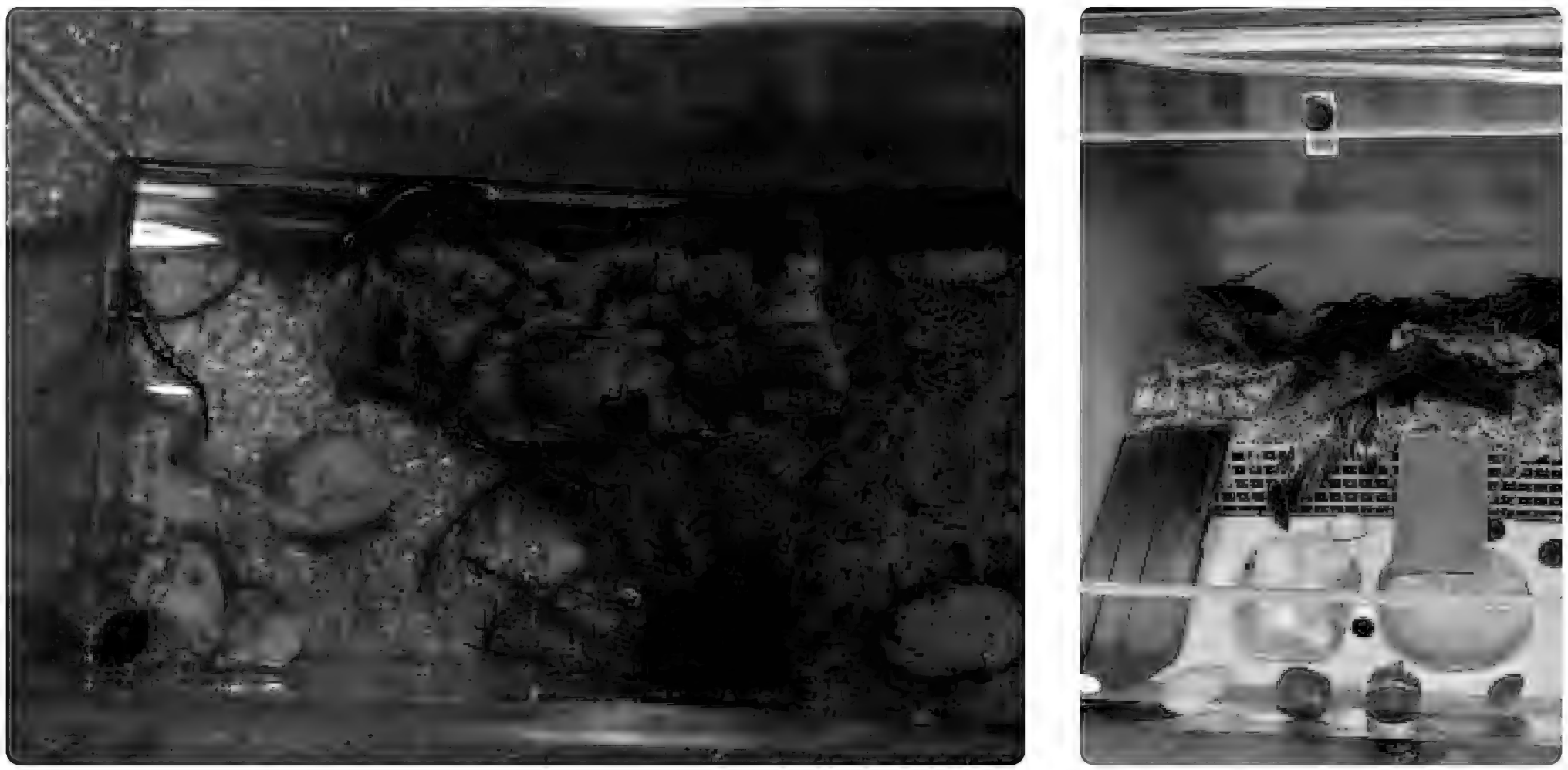
Eggs

Fertilized eggs begin to develop into an embryo only about two days after being laid. These embryos will quickly develop and hatch into larvae after an average of nine days.

Larvae

Larvae emerge with just their front limbs developed. They are very pale grey, almost transparent, with miniscule dorsal spots. At this stage, they begin to eat tiny invertebrates (i.e. 24-hour or 48-hour baby brine shrimp) and will grow rapidly. They will develop the hind limbs and gills during which time they may graduate to larger food items (i.e. daphnia, adult brine shrimp, bloodworms; Figure 2). The larvae have been shown to develop more quickly at higher temperatures (between 70 and 72 degrees F) but regardless of temperature require higher oxygenation levels than the adults. Larvae may cannibalize if food is scarce or if kept in tanks that are too densely populated (Vaissi et al., 2016). For this reason it is best to separate larvae based on development stage and size. A larval rearing tank is recommended, with several small mesh-sided kritter keepers or nurseries to separate size groups (Figure 3). The larval rearing tank set-up consists of a 300 liter tank (86 cm length x 40 cm height x 50 cm width) with

Figure 5. Metamorph tank on the bottom left positioned at an angle to allow for half aquatic and half terrestrial set-up. Uses an air pump for high oxygenation and soft substrate. Bottom right tank with fully securing lid and doors for fully transitioned terrestrial newts. False bottom allows for easy cleaning with ramps allowing easy access from water to land area. Photos by Kelsey Paulling.



overflow that flows through a filter sock, sump, Arctica titanium water chiller and cycles back into the tank. Smaller mesh-sided nurseries (16.5 cm x 12 cm x 12 cm) are suspended within the tank to lower the densities of newts and house them separately based on size (Figure 3). Stellar 60 Hz air pumps oxygenate the water and create water flow. Water changes with 50% Deionized and 50% Dechlorinated freshwater and siphoning should be carefully conducted daily to remove debris and uneaten food as water quality is very important at this stage of development.

Mortality events most commonly take place in the very early stages of larval development, within the first month. In our experience after two months of age the larvae had a drastically reduced rate of mortality. Causes of mortality are uncertain, however, cannibalism is one cause. Partial cannibalism in the form of missing limbs also occurred, however regeneration was observed in the tails and limbs. Full regeneration took several weeks (4 to 8 weeks) depending on the extent of loss.

Metamorphs

After approximately three months, the larvae begin to develop the bright black and white dorsal patterns, and orange bellies and legs. At this stage, the larvae are about ~5 cm long and begin to absorb their gills, preparing for the terrestrial phase to complete their metamorphosis (Figure 4). These metamorphs are moved to a metamorph tank that consists of half aquatic and half terrestrial set-up allowing them full range of habitats. Once their gills are fully absorbed and they begin to emerge on land they can be moved to a fully terrestrial set-up, with access to water, and be offered terrestrial foods (i.e. pinhead crickets, springtails, fruit flies (*D. melanogaster*)). The tank set-up for the metamorph stage consists of one or more 38 liter kritter keepers, or other terrarium, set up on an angle to allow for about 5 cm of water on one side and a fully terrestrial set-up on the other (Figure 5). Small stones may be used as substrate in the aquatic side, while sphagnum moss, cork bark, stones, or any soft substrate that is not easily ingested may be used for the terrestrial side. A Stellar 60 Hz air pump creates turbidity and oxygenates the water. The terrestrial tank set-up can use hydrated sphagnum moss and pebbles as substrate, with cork bark for shelter. It is important to include a water dish or pool for rehydrating if they choose. The set-up that was found to be most successful consisted of a land shelf built on an egg crate platform to allow for easy water changes and cleaning. Make note, however, that terrestrial phase newts are very active and are able to climb, so a secured tank is necessary as they will attempt to disperse.

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Photo credit to Tim Wong, Senior Biologist and Kelsey Paulling, Biologist I at The California Academy of Sciences.

Dogs In Conservation

Christina Lavallee
Ambassador Animal Lead Keeper
Zoo Atlanta
Atlanta, GA

Scent detection dog - Train.

ABSTRACT

Dogs are found ubiquitously across the globe. Some remain fully domesticated; some maintain some limited connection to humans and others have returned to a completely feral state. Dogs are remarkable tools for conservation as they can assist in detecting invasive and endangered species, scat from other species, products from wildlife, and stop poachers. However, dogs can also have detrimental effects on wildlife. There are issues with predation, hybridization, competition, disease transmission, and disturbances to other wildlife. There is also concern about their impacts on human health. With the support of the public, governments, and organizations, collaborations and partnerships can enhance species conservation through responsible dog ownership and comprehensive management programs.

INTRODUCTION

Many of us, including zookeepers, have dogs at home that they care for outside of their work duties. The affection that we have for our animals and vice versa permits their perceived innocence, and we enjoy the positive role they take in our lives. Dogs are an asset to conservation; they can detect invasive and endangered species, animal scat, wildlife products, and stop poachers. However, there is a dark side as dogs pose a major threat to endangered species. Since dogs cohabitate near humans, their impacts are often overlooked. Many people don't realize the impacts that dogs have on wildlife including killing and harassing wildlife leading to increased stress and energetically costly behaviors (Young et al., 2011). Dogs also have the potential to hybridize and outcompete native species. There is also a concern as dogs spread zoonotic diseases to other species (like canids, felids, ursids, and pinnipeds) and impact human health. It is important to look at the dog's effect on conservation issues, the concern for

human health, and animal welfare when coming up with solutions. Solutions are often impacted by funding, so an approach that takes some if not all issues into account will benefit several goals. As conservation professionals, we need to educate ourselves on the threats and solutions and disseminate with those we come into contact with to encourage appropriate and responsible pet ownership and research.

Biodiversity loss affects most ecosystems across the globe. The effect of domestic mammals needs to be addressed as they damage and negatively impact endangered and threatened species impacting biodiversity, health (including human), animal welfare, and conservation (Genovesi et al., 2012), which is ultimately a threat to profitability (Kettunen et al., 2009). Economic, social, and political values impact domestic animal use in conservation and need balance and discussion to succeed (Hughes and Macdonald, 2013). With the human element intertwined with the domestic impact, it is essential to have support from the public, governments, and organizations to create solutions based on local values. Removal of established feral species can succeed with human support.

Dogs (*Canis familiaris*) have a near-global distribution following where people have dispersed (Doherty et al., 2017). They have a history with humans going back over 15,000 years. Dogs have evolved over generations to live alongside humans in our homes and our communities. They play many roles and purposes as guardians, helpers, sacred icons, pets, family members, and are utilized for agriculture. In our daily lives, they are utilized for various purposes including detection of narcotics, explosives, missing or deceased persons. Dogs and cats are the most ubiquitous domestic carnivores living with people and within communities (Hughes and Macdonald, 2013). Dogs have various demographics, living within households, free-ranging, and feral. Free-ranging dogs are dogs that are allowed to roam unsupervised; feral dogs have minimal contact with humans and tend to roam in packs. There is an estimated global population of over 700 million dogs, with free-roaming dogs allowed to roam unsupervised, accounting for approximately 75% of the global population (Hughes & Macdonald, 2013).

BENEFITS TO WILDLIFE

Dogs impact conservation in many positive ways primarily through their detection abilities. The dog's advantage is its nose. It has 300 million olfactory receptors making it sensitive to various scents including those of live plants, animals, pathogens, scats, carcasses, and biological materials (Barnett, 2020; Harrison, 2006; Beebe et al., 2016;). They are utilized to help study other species, identify endangered and invasive species, and assist in anti-poaching and trafficking campaigns (Barnett, 2020). Detection dogs are a tried and proven technology that is more effective and efficient than other survey methods (Harrison, 2006). Dogs can cover more ground and maneuver through a variety of terrain types, better than their biped counterparts. Dogs are a non-invasive method of detection as they don't require luring animals to specific areas to collect data. How does this work in the field? Animals leave little scent markers in the environment often in the form of waste products. Wastes are found by dogs and collected by researchers. Researchers can then identify individual animals, gender, reproductive condition, if species are present in an area, and where the animal is traveling in a landscape (Wildlife Land Trust, n.d.). Dogs can be trained on one species or to identify several. They can even discriminate between different species' feces within bodies of water. This can be very important when trying to detect the density of endangered species.

Based on the rate of detection, cost, and time required, dogs had ten times more detections over camera traps, hair snares, and scent station surveys and only required one visit to a survey site to provide useful indices for population monitoring (Harrison, 2010). Since dogs can be trained on multiple endangered or threatened species, they can be helpful in different biomes where they can focus on target species. They have been used in finding bumblebee nests, live reptiles, birds, bush dog burrows, sea turtle nests, carcasses of bats and birds, and many others. Dogs can even locate endangered plant species so researchers can collect and propagate them, like Kincaid's lupine (*Lupinus sulphureus kincaidii).* Furthermore, they have been used to help locate elusive species like bobcats, bog turtles, and pine snakes (Barnett, 2020; Harrison, 2006).

With their sensitive noses, dogs can detect invasive species as well. They are key to helping researchers find and eradicate them quickly. Trained scent detection dogs can even find microscopic larval zebra mussels and invasive snails in Hawaii. Dogs can smell and detect twice the number of invasive plants that humans could observe with their eyes (Goodwin et al., 2010, Roheleder, 2019). Dogs also located smaller plants from greater distances than their human counterparts (Goodwin et al., 2010). They can even find plants that haven't made it above ground yet, like the spotted knapweed *(Centaurea stoebe)* in the western U.S. (Goodwin, et al., 2010) and scotch broom (*Cytisus scoparius)* in the pacific northwest (Roheleder, 2019).

Canine units have been trained and implemented in combating poaching in several countries in Africa. Some dogs are trained in the detection of ivory, rhino horns, and pangolins. These dogs are stationed at countries' major entrance and exit points like international airports, seaports, export hubs, and other checkpoints (Garrigan, 2015) Other dogs work in the field to chase down and apprehend poachers. Since canine units were introduced in 2012 at Kruger National Park in Africa, dogs have assisted in 80% of arrests, the most significant technology utilized in anti-poaching campaigns (Fuchs, 2018).

What makes a successful detection dog? Personality is more important than breed or pedigree. Dogs must be able to adapt to new environments, distractions, and work with human trainers (Wildlife Land Trust, n.d.). Selecting an appropriate dog is key. They tend to be energetic shelter dogs, that usually have a high play drive, high energy, and intelligence (Barnett, 2020). Many resources mention that detection dogs are so high-strung that they fail out of home life. So these types are dogs that otherwise wouldn't be adopted. Most have been trained by a conservation detection dog organization (Beebe et al., 2016). Each dog's unique personality and physical characteristics play into the type of conservation role they might play.

Dogs might have fears, damage samples, act dangerously towards native wildlife, or have incompatible characteristics (Matteo et al., 2019). It is also important for the handler's personality to be in balance with the detection dog so the two-member team can read each other for success in the field.

A successful conservation dog's challenges occur before they even get in the field. Some of these challenges are selecting the right individual, training, and housing of animals that may or may not work out for the program (Barnett, 2019). The training that goes into the dogs is extensive and requires an experienced trainer. The animals need to be cared for and housed appropriately, which could take space away from other potential animals. There is also the potential possibility that the animal will not work out for the conservation program. As with any animal, there is routine care and the added challenges of potential health issues that come from doing the work. Some other challenges can occur on location or getting to the field site. Depending on the number of scat detections required and weather conditions, dogs may require more field time than other more commonly used methods (Harrison, 2010). International transportation, quarantine, and handler fees add to pre-existing research fees. However, collaborating with in-country police that already utilizes dogs for detection can dramatically minimize costs associated with detection dogs (Orkin et al., 2016).

DISADVANTAGES TO WILDLIFE

The connection to 'man's best friend' has blinded people to many conservation issues that dogs have caused. They are responsible for extinctions and threaten nearly 200 species (Hughes and Macdonald, 2013; Young et al., 2011). Human health and economics need to be taken into consideration. Every year, approximately 4.7 million people, mostly children, are bitten by dogs (feral and domestic); causing several hundred deaths and costing $165 collectively (Pimentel et al., 2014). Many communities eradicate dogs that are threats to public health, surplus animals, or if funds are unavailable for the animal's care (Hughes and Macdonald, 2013). The welfare of free-ranging dogs is of concern. They may suffer from higher mortality through malnutrition, starvation, parasitism, disease, or abuse.

Dogs impact species and their conservation statuses through predations, disturbance, disease transmission, competition, and hybridization (Doherty et al., 2017). In some areas, they are a prey source for other predators. Dogs are prey for lions and leopards in Africa and Asia respectively (Hughes and Macdonald, 2013). It is unknown what happens to the predator populations if dogs are removed from the environment. Continued research on the impact of dogs needs to continue to fill in these knowledge gaps.

Diseases like rabies, canine distemper virus, and about 60 other zoonoses are associated with dogs (Hughes and Macdonald, 2013). Since dogs are the shared link between humans, livestock, and wildlife, dogs act as both a reservoir and a vector (Young et al., 2011). With rabies-infected dog populations around the territories of the rarest canid, the endangered Ethiopian wolf has suffered from rabies epidemics for the past 20 years. There has been a loss of African wild dog packs in the Serengeti and a 30% decrease in lion populations. Dogs act as a bridge passing canine viruses like canine distemper and canine coronavirus to seals, pandas, and other species furthering population declines (Callen et al., 2020; Young et al., 2011). In addition, internal parasites from dogs are spread by numerous species.

There is also a concern about hybridizations. It can reduce the reproductive potential, meddling with the population's genetic integrity, making disease transfer easier. Dogs have hybridized with many canids including the Iranian wolf, grey wolves, coyotes, dingo, and golden jackal (Twardek et al., 2017). The limited red wolf population has had issues with keeping the genetic strain pure as they breed with coyotes or even coyote/dog hybrids.

The effects of a dog across an ecosystem are complex and can provide positive or negative effects depending on other predators in the area and food availability. In a few cases, it appears as if they restore biodiversity by preying on smaller predators and suppressing medium-sized herbivores contributing to more food and shelter for smaller native species with higher diversity and abundance of native mammals (Ritchie et al., 2013). Dogs are known to kill wildlife and harass a variety of species. Even the threat of free-ranging dogs reduced available habitat for pandas (Callan et al., 2020). This leads to increased stress and overexertion of native species (Young et al., 2011). Many animal species have been impacted including kudu, rodents, birds, and reptiles. It has been observed that dogs harass at least three endangered ungulate species in Mongolia (Young et al., 2011). Even the simple act of walking a dog on a leash caused a 41% reduction in individual birds and a 53% reduction in species richness compared to sites where no walking occurred (Banks and Bryant, 2007). Wolves have even been blamed for livestock conflict when fecal results identified dogs as the culprit. (Young et al., 2011). They have impacted island populations causing wildlife extinctions including the Galápagos marine iguana, kiwi, and conga hutia in Cuba. Other species were harassed to the point that humans stepped in and removed or eradicated problem animals. One dog decimated the kiwi population, 12 dogs were removed from the island where the Fijian frog lives, and through the waste reduction in an agroecosystem, the dog abundance was reduced (Hughes and Macdonald, 2013). Particularly on islands, animals that are range-restricted, defenseless, and where a few dogs can predate a lot of animals are where the impact is strongly seen.

Due to the human-animal relationship, there is a reluctance to undertake dog population management when there is a dog issue. In the US, laws exist in 44 states allowing prosecution of owners or dogs that harass wildlife, yet many agencies are often understaffed or underfunded (Young et al., 2011). Many owners are oblivious that this is a reason for leash laws and why animals should be restrained. There is an aversion to feral dog management methods used (poisoning and shooting) with a lack of alternative strategies. Plus, there is a perceived cost to any action. Combining efforts with groups already active in the field with experience can help. Collaborations with conservation biologists, animal welfare groups, and health workers can work together for vaccination, control,

and learn new methods for solving the complicated issue. These collaborations can even address conservation, animal welfare, and human health. Additionally, public awareness campaigns are needed that focus on dog-created problems and the training of companion dogs to not harass wildlife (Young et al., 2011).

SOLUTIONS

Collaborating with partners to create effective plans is essential to managing dogs in environmentally sensitive areas. From eradication to removal, many options need to be considered. Spay/ neuter programs are a great option to reduce population growth, curb hormonal behaviors, reduce health risks, and are a cost-effective option. Euthanasia rates increase exponentially in areas where spay/ neuter programs are not available. Unfortunately, euthanasia can be inhumane and ineffective as other dogs will move into the vacuum created. Management and control of feral and free-roaming dogs benefit biodiversity and public health in rural China (Callan et al., 2020). Dog mass vaccinations will ensure the population is disease-free. Additionally, legislation needs to be created and adhered to to create the best solutions for all native wildlife. A study by Parsons et al. (2016) showed that 97% of dogs were accompanied by people; species avoided people with and without dogs in protected areas in the eastern US. Despite disregard for leash laws and posted regulations, there was a 90% decrease in people walking off trails with dogs showing regulations do reduce dog impacts (Parsons et al., 2016). The combination of regulations and responsible pet owners provides outdoor enjoyment in addition to reducing the environmental impacts caused by dogs. Zoological facilities with ambassador dogs can educate guests on the importance of leash regulations especially when in biologically sensitive areas. As conservation professionals, we need to set the example through our actions and conversations to ensure we are acting locally for our native wildlife.

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Training Greater Rheas for Voluntary Radiographs and Hand Injections

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The mixed-species South America exhibit at the Milwaukee County Zoo is home to 0.2 greater rheas (*Rhea americana*). Rheas, Rose and Blanche, joined the zoo in 2016 at the age of four months along with another female named Dorothy. Annually, these birds were manually restrained for blood collection and vaccinations. Restraining rheas can be dangerous as they can kick with enough force to seriously injure keepers and may also injure themselves while avoiding capture. Unfortunately, during capture for medical reasons, we lost Dorothy due to a leg injury that occurred during restraint. Faced with the risk and difficulties of handling these birds, we prioritized using positive reinforcement and desensitization to work towards the rheas accepting injection voluntarily. Since ratites are known to ingest metallic objects, we also decided to work towards getting voluntary radiographs of the gastrointestinal tract.

Photo 1 (Left). Radiograph plate holder wall. Photo by Katie Prinsen.

When the rheas first arrived at the zoo, they would typically avoid keepers and novel situations. Over time, they learned to shift using a bell recall. By two years of age, they had become more socialized with keepers and had begun taking grapes from our hands. From there we taught them to peck a plastic bottle target using a clicker as a bridge and hand-fed grapes as reinforcement. Free contact training occurs in an indoor exercise area attached to the rheas' holding stalls and in an outdoor exercise area adjacent to their exhibit. A four-foot tall chain-link fence separates two sections of the yard, and initially the rheas were more comfortable training with this barrier between us and them. After targeting was established, they were introduced to a 3.5' x 3.5' plywood training wall. Food items were placed by the wall to encourage them to approach it. They also became comfortable eating their diet out of a hanging feeder placed on the chain-link fence. Once the rheas became comfortable with the hanging feeder and training wall, radiograph and injection training began.

RADIOGRAPH SETUP

Radiograph training occurs in the indoor exercise yard. We designed and built a new plywood training wall specifically for holding radiograph plates (Diagram A and Photo 1). The rheas are trained to stand between this wall and the generator. The radiograph wall is made of commercial timber and plywood. It

Photo 2. Blanche lined up for radiograph. Photo by Brooke Ferrell.

measures 42" tall x 48" long x 1/2" wide. It is supported by two upright 2x4s and two 1x6 "feet". Each "foot" is comprised of two parts: a 1x6 board that is 22" long sits on the floor with a 1x6 board that is 11" long placed on top of the back half of the bottom board. Two gussets connect the feet to the uprights, and a crossmember provides stability between both feet. There are 323 9/32" diameter holes drilled through the plywood in a 2"x 2" grid pattern. This measurement was accomplished using a standard 1-inch peg board as a template. The radiograph board itself is held together with metal screws, which are only around the outermost edges of the radiograph board and do not interfere with the radiograph image. To securely hold the heavy and delicate radiograph plate, two 15-inch wooden shelves were made to equal the size of the radiograph plate. The shelves require the use of four threaded fasteners for secure support. The opening on the shelf is 15/16". This allows the ¾" radiograph plate to easily slide into position while remaining secure. The shelves are secured to the board with removable 3-inch long ¼" nylon hex bolts and matching hardware. The nylon material does not interfere with the radiograph image.

RADIOGRAPH TRAINING

To begin radiograph training, the rheas were reinforced with produce in a hanging food bowl placed on a chain-link door that separates two indoor exercise yards. The radiograph wall was placed by the chain-link door, and the rheas became habituated to this wall by walking past it to shift outside and then by eating near it. Using positive reinforcement, we worked to desensitize Rose and Blanche to tools and novelties similar to what they would encounter when having actual radiographs taken. First, they were introduced to a cardboard box made to look like the radiograph generator. The box was placed on the floor in their indoor exercise yard and then food was put near it and on it. Once they were approaching and eating near the box, it was moved closer to the radiograph wall. To capture radiograph imagery, the generator would eventually be set on top of wood boards stacked on top of a large bucket thus allowing us to stand six feet away from the generator. This bucket stand with the cardboard box on top of it was added to the exercise yard and was slowly moved closer to the radiograph wall until the rheas would eat out of the feeder with it a few feet away. Next, the primary trainer stood near the box while the rheas ate out of the feeder. We then added an extension cord to the box which was connected to an outlet, and the trainer held another extension cord to resemble the generator trigger. The trainer then held a bright flashlight with a red and white setting to mimic the collimated beam. Once the rheas were comfortable eating out of the feeder with those items, we added a model radiograph plate made of cardboard to the shelves on the radiograph wall, and two trainers wearing cloth aprons similar to x-ray gowns stood near the box. Because we waited until the rheas finished eating and walked away before changing the plate for a new one, Blanche and Rose had to learn that they would be reinforced for coming back to the feeder, so we added more food each time the plate was replaced. Lastly, we had to desensitize the rheas to the plate being in different locations on the radiograph wall.

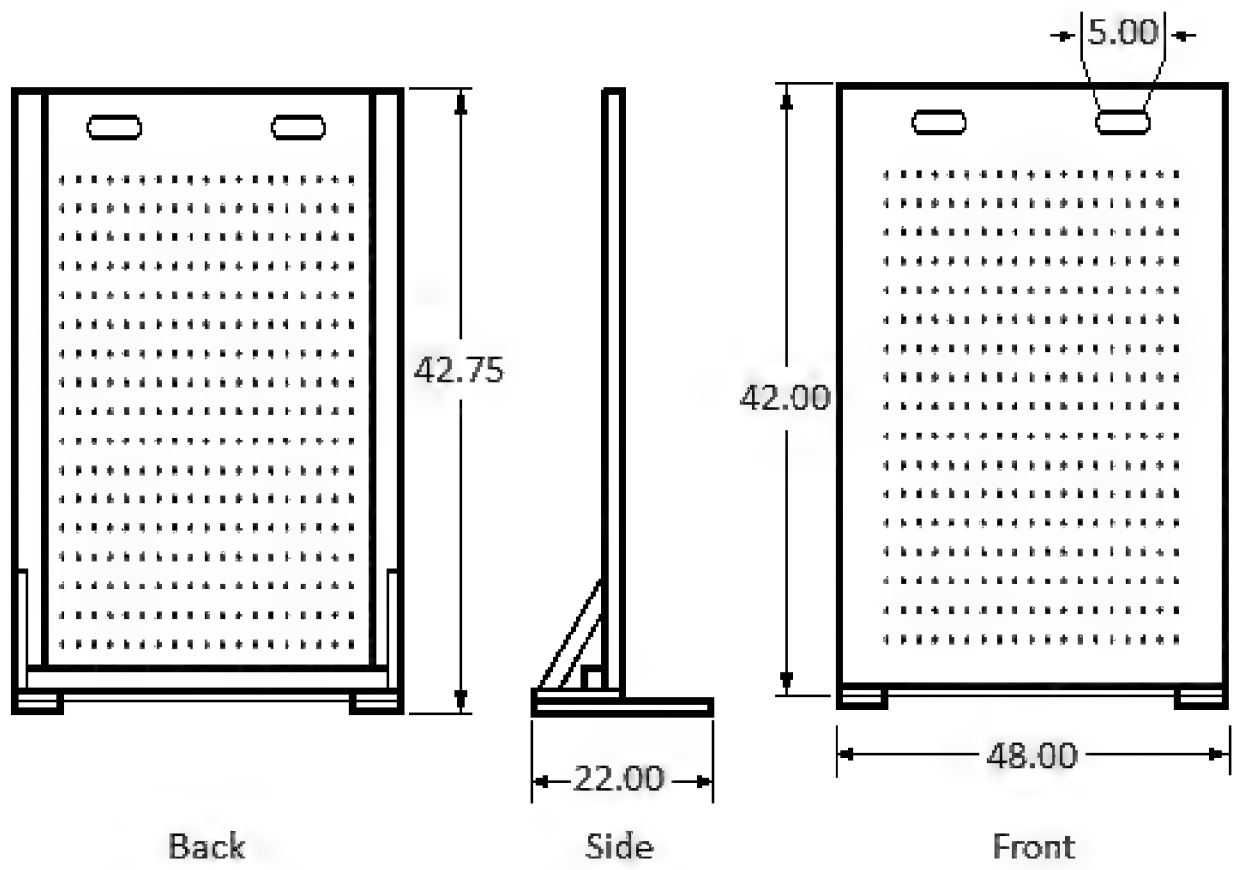

Diagram A. Design and measurements in inches of the radiograph wall.

CHALLENGES AND RESULTS

After nine months, we were able to take the first radiographic images of Blanche and Rose. We did come across obstacles along the way. A few months after training started, we had to restrain Blanche and Rose which resulted in some regression in their training. Even though the primary trainer was not involved in capture, it still took two months for Rose, the more cautious bird, to participate in training again and build back her confidence around us. When the actual radiograph equipment was first added, the birds were hesitant to approach the wall, but by the third attempt both rheas did participate. Additionally, Blanche and Rose were not consistently lining up close enough to the radiograph plate, therefore we had to put down a 2x4

Photo 3. Left lateral radiograph image of Blanche. A 25-cent coin was taped to the plate to confirm technique was appropriate for detecting coins. Photo by Zach Mills.

Photo 4. Injection training with Rose. Photo by Becky Gliniecki.

board on the floor to help guide them in a straight line next to the plate. Adding the 2x4 also helped prevent both rheas from coming up to the feeder at the same time. The slight movement of the rheas eating as the radiographs were taken produced blurry images, so we had to wait until they paused to press the generator trigger. To test if our technique was correct, we taped coins to the radiograph plate behind the area of the femur and ventriculus to make sure metal would be detected if they ingested it. We successfully obtained diagnostic images to detect any metal consumption, and the taped coins showed up on the processed radiographs (Photo 3). We were also successful in getting a radiograph of the area of Blanche's reproductive tract to rule out egg binding when a medical issue was being diagnosed.

INJECTION TRAINING

Injection training takes place in the outside exercise yard with both rheas in view of each other. Since Blanche is more outgoing with keepers, we were able to stand next to her and target her while another person desensitized her to the feeling of the syringe needle poking her lower leg muscles. Later, we tried letting her eat out of a shallow bowl continuously during the session, and we found she reacted less to the poke than when targeting her. Since Rose is less accepting of close interaction, she would only participate in injection training when the trainer was on the other side of the chain-link fence. While eating out of a hanging feeder between the plywood training wall and the fence, her leg comes close enough to the chain-link for us to work on desensitization to touch and for a syringe to fit through for injection. Blanche and Rose now accept hand injections voluntarily.

After over two years of continuous training, Blanche and Rose went from avoiding keepers to now being eager to interact, and they will even approach tour groups for lettuce. Our next goal for Blanche and Rose is voluntary blood collection from the right jugular vein or medial metatarsal vein, as Blanche already allows us to palpate these veins while she is being fed reinforcement. Although restraint of these birds may be needed in the future, we hope this training will minimize having to do so. We hope to utilize the versatility of the radiograph wall to obtain voluntary radiographs of other species at our zoo.

Special thanks to: Lead Veterinary Technician Zach Mills, Volunteer Bob Walker for helping design and construct the radiograph wall, and for ideas and support from Winter Quarters Keeper Jon Honkala and Winter Quarters Supervisor Danielle Faucett.

Training Tales Editorial

Kim Kezer, Training Tales Co-Editor

Past experiences that we as care givers have had, both positive and negative, are all learning opportunities to improve our welfare practices for our animals. Using operant conditioning technique to build behaviors to reduce and even eliminate the need to capture and restrain animals is an important goal to strive for. This staff at the Milwaukee County Zoo have taken a proactive approach to training rheas to participate in their care to reduce potential injury to both animal and staff.

This Tale demonstrates the benefits of developing a well thought-out approach utilizing available resources, such as fellow keepers, volunteers, and vet techs. Building trust and confidence with an animal that is suspicious and unsure of novel situations, takes a dedicated team to provide patience, consistent interactions, and working at the animal's pace rather than rushing the process. I appreciate you sharing the details of your set up along with the modifications made along the way. Congratulations and thank you for sharing your training success with the AAZK membership. We look forward to hearing more about the future training success you have with blood collection. Hint, hint, sounds like another Training Tale submission!

San Diego Zoo Wildlife Alliance Academy

HELLO AAZK MEMBERS!

As you are well aware, finding the time and resources for training and development are quite scarce these days. The San Diego Zoo Wildlife Alliance Academy was created to address this very issue! The Academy is an online learning platform that harnesses the expertise of the San Diego Zoo Wildlife Alliance and its partners to offer courses that meet the specific needs of individuals who work at zoos and aquariums, in the animal care and welfare industry, and students who are working towards a career in zoology or wildlife care.

Using compelling, relevant content, the Academy immerses learners in the subject matter, presents challenging and thought-provoking material, and guides learners in a creative and engaging manner as they build professional knowledge and skills.

The Academy was created in 2012 in collaboration with CypherWorx. We offer one-of-a-kind courses and learning paths dedicated to Animal Welfare, Behavior, Care and Management.

Course Examples:

TRUST-BASED ANIMAL TRAINING - ELEPHANTS

Learn how our Wildlife Care Specialists manage elephants in a modern, trust-based system.

THE ETHICS OF ANIMAL CARE

This course is designed to help animal care staff and others understand the role of ethics in their daily professional activities.

INTRODUCTION TO ENRICHMENT

This class establishes the components of an enrichment program, the approval process, and questions that should be considered before the provision of any enrichment.

Members also have access to hundreds of other professional development courses. With a dedicated Academy site for your organization, many additional features also become available to you, including:

- Ability to manage users
- Reporting capabilities
- Members also have access to hundreds of other professional development courses. With a dedicated Academy site for your organization, many additional features also become available to you, including:
- Ability to manage users
- Reporting capabilities
- Ability to set up teams
- Ability to share documents and resources

The create-a-course option allows users to publish customized courses for your site members. This feature has become very popular, especially during COVID, to educate and train team members regarding new policies, procedures and operations.

Safe Capture Chemical Immobilization training is also offered through the Academy. This training provides the most complete, up-to-date instruction available on chemical immobilization of animals, presented in an easy-to-understand manner that is applicable to all experience levels. The instructors are veterinarians who specialize in remotely-delivered anesthetic agents. This course has been approved for CE credits by RACE/AAVSB. We now offer this training in three formats:

- In-person
- Livestream
- Self-guided eLearning modules

As a member of the Academy, AAZK manages a site dedicated to its members. We hope you have taken advantage of the courses they offer. As collaborative partners, we are always looking for ways to improve and learn from our members and from zoos and aquariums. If you'd like to get involved with content creation, have resources to share, or have other ways we can assist you as AAZK members, please let us know!

FOR MORE INFORMATION,
visit our website:
www.SDZWAAcademy.org
or e-mail us at:
SDZWAAcademySales@sdzwa.org

The Academy is an online learning platform that harnesses the expertise of the San Diego Zoo Wildlife Alliance and its partners to offer courses that meet the specific needs of individuals who work at zoos and aquariums, in the animal care and welfare industry, and students who are working towards a career in zoology or wildlife care.

Want to Save
Songbirds!

American Songbird Program

So, you've heard about the AZA SAFE program for native songbirds and think it's pretty great, but aren't quite sure how to get involved? Look no further! The SAFE North American Songbird (SAFE NAS) program has compiled some easy ways for anyone and everyone to help! Whether you exhibit North American songbirds or have them taking up residence at your facility, we invite you to get involved in the SAFE North American Songbird Program and join SAFE NAS flock members who are making a measurable difference to the survival of these very special, and often familiar, species. The SAFE North American Songbird program works to reduce bird mortality from cats and window collisions, create empathy for and awareness about songbirds, reduce songbird trafficking, advocate for bird-friendly products and against harmful contaminants, create habitat, and participate in citizen science. SAFE NAS is an effective way for zoos and aquariums to secure a future for songbirds. We welcome all zoos and aquariums to get involved as Program Partners and also welcome help on an individual level from keepers, managers, curators, educators and more! We invite everyone to share your expertise by contributing even more to conservation by participating in SAFE NAS. Each of our initiatives are led by individuals who are passionate about saving native songbirds. Please reach out to them for more information or e-mail the co-chairs Sara Hallager (hallagers@si.edu) or Dr. Mike Kreger (Michael.Kreger@columbuszoo.org) for more information.

SAFE North American Songbirds - Education Working Group - Opportunities for Engagement

Led by Matt Igleski
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1. Create social media content: infographics, photos, and videos (especially for the purpose of expanding our presence on other platforms like Instagram, or even Tik Tok)
2. Gather relevant photos from AZA institutions to use for presentations and social media
3. Gather and organize materials to share for events like World Migratory Bird Day

Great Crested Flycatcher photo by Dave Liggett.

Painted Bunting photo by Dave Liggett.

SAFE North American Songbirds - Native Songbird Trafficking Working Group - Opportunities for Engagement

Led by Mike Kreger,
Columbus Zoo and Aquarium
Michael.Kreger@columbuszoo.org

1. Prepare social media posts – what to do if you find a sick or injured bird, what to do if you find bird traps or see suspicious activity, why you should not keep a native songbird as a pet, buyer beware – native songbirds
2. Prepare a songbird trafficking fact sheet – awareness, engagement
3. Write an article about songbird trafficking for *Animal Keepers Forum*

(Opposite page, top) Red winged Blackbird photo by Stanley Bysshe
(Opposite page, bottom left) Northern Parula Warbler by Eric Peterson.
(Opposite page, bottom right) Eastern Towhee photo by Dave Liggett.

SAFE North American Songbirds - Roaming Cats Working Group - Opportunities for Engagement

Led by Michelle Smurl,
Palm Beach Zoo
msmurl@palmbeachzoo.org

1. Promote bird-safe cat ideas (e.g., keep cats indoors, catios, walking cats on leashes) on social media once per month.
2. Like and share Roaming Cats Working Group's social media posts.
3. Submit ideas and pictures to the working group for social media posts.
4. Combine TAG efforts by supporting roaming cat initiatives across the board

SAFE North American Songbirds - Collisions Working Group - Opportunities for Engagement

Led by Bonnie Van Dam
Detroit Zoo
bvandam@dzs.org

1. Help write an article about a Lights Out Program that keepers are working on for the *Animal Keepers' Forum.*
2. Help compile a group of pictures of bird-collision work from our Program Partners.
3. Help compile a list of most common species involved with collisions with Mike Taylor.
4. Assist BC team members who are working on the Safe – NAS flyer.
5. Help gather info on social media postings.

SAFE North American Songbirds - Habitat & Contaminant Working Group - Opportunities for Engagement

Led by Anne Tieber
St. Louis Zoological Park
Tieber@stlzoo.org

1. Help spread the news that native plants are beneficial to birds/ pollinators and to the ecosystem in general.
2. Help spread the message of "reducing" turf areas.
3. Help gather info on social media postings.
4. Providing images of native plant areas around respective institutions.

SAFE North American Songbirds - Citizen Science Working Group - Opportunities for Engagement

Led by Dr. Joe Smith
The Wilds
jsmith@thewilds.org

1. Help write a section of the Motus manual.
2. Provide pictures for the Motus manual.
3. Provide lists of suppliers used by your institution for the Motus manual.
4. Engage with a regional Motus collaborative group in your area to help stay updated on the larger Motus network happenings in your area and to identify opportunities for AZA/SAFE collaboration.
5. Compile a list of 'birding days' (e.g., National Migratory Bird Day, Big Sit, Christmas Bird Counts, etc.) and the partner zoos that utilize them to engage guests with citizen science.

The SAFE North American Songbird program works to reduce bird mortality from cats and window collisions, create empathy for and awareness about songbirds, reduce songbird trafficking, advocate for bird-friendly products and against harmful contaminants, create habitat, and participate in citizen science.

SAFE North American Songbirds - Bird Friendly Coffee Working Group - Opportunities for Engagement

Led by Sara Hallager
Smithsonian National Zoo &
Conservation Biology Institute
hallagers@si.edu

1. Work with the Coffee Team to spread the word about BFC through AAZK and AZA networks, *Connect, Animal Keepers' Forum*, etc.
2. Help gather information for Facebook postings
3. Contact institutions to compile a list of ways that AZA institutions are using Bird Friendly Coffee to engage with guests.

Evening Grosbeak photo by Dave Liggett.

Cedar Waxwing photo by Eric Peterson.

Cerulean Warbler photo by Stanley Bysshe.

Indigo Bunting photo by Stanley Bysshe.

Chestnut Sided Warbler photo by Dave Liggett.

Northern Oriole photo by Dave Liggett.

Bluebird photo by Stanley Bysshe.

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